DOCUMENT RESUME

ED 291 941 CE 049 793

TITLE	Industrial Enterprise. Grade 12. Course #8196 (Semester). Technology Education Course Guide. Industrial Arts/Technology Education.
INSTITUTION	North Carolina State Dept. of Public Instruction, Raleigh. Div. of Vocational Education.
PUB DATE	88
NOTE	46p.; For related documents, see CE 049 780-794.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Behavioral Objectives; *Business; Grade 12; High Schools; *Industrial Arts; *Industrial Structure; Learning Activities; Learning Modules; Lesson Plans; *Manufacturing Industry; State Curriculum Guides; Systems Approach; *Systems Development; *Technology
IDENTIFIERS	North Carolina

ABSTRACT

This guide is intended for use in teaching a course in industrial enterprise. The course, which has been designed using a student-centered approach, is intended to help students understand the dynamics of an industrial enterprise as a fusion of two technologies--material processing and management. The first two sections discuss the guide's development within the framework of North Carolina's efforts to improve technological literacy and the guide's place as part of an instructional system. A list of the course's major objectives and a course outline are provided next. The remainder of the guide consists of learning modules on the following topics: components in a managed production system and industrial enterprises, developing a product for manufacture, organizing an enterprise, operating an enterprise, and closing an enterprise. Each module includes information about the length of time needed to complete the module, an introduction to the instructional content to be covered in class, performance objectives, a day-by-day outline of student learning activities, related flowcharts and line drawings, and lists of suggested textbooks and references. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

CE049793

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

E Brunbach

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Activities and procedures within the Division of Vocational Education are governed by the philosophy of simple fairness to all. Therefore, the policy of the Division is that all operations will be performed without regard to race, sex, color, national origin, or handicap.

IF THERE ARE ANY QUESTIONS, PLEASE CONTACT THE INDUSTRIAL ARTS/TECHNOLOGY EDUCATION OFFICE BY MAIL (116 WEST EDENTON STREET, EDUCATION BUILDING, RALEIGH, NC 27603-1712) OR BY PHONE (919/733-7970).

ACKNOWLEDGEMENTS

The North Carolina Technology Education Curriculum is the product of a curriculum redirection process begun in the early seventies. As in any change process, many individuals have contributed their time and energies to provide North Carolina students with a curriculum designed to meet their needs to be technologically literate adult citizens. The following are recognized for their vision and leadership in setting the direction for Technology Education in North Carolina schools.

Members of the N.C. Curriculum Study Taskforce who charted the course for technology education in North Carolina schools. Their study report and recommendations provided the direction for a change in the identity of the discipline and a total redirection of the curriculum.

Members of the N.C. Curriculum Committee who validated the Technology Education Curriculum Guide as appropriate study for assisting students in understanding technological systems impacting on their lives. Further, industry representatives of the committee verified the appropriateness of suggested activities reflective of practices in construction, communications, manufacturing, and transportation.

N.C. Technology Education Association who provided a forum for redirection of the discipline. It was the association that led the profession in changing identity to technology education. The association also provided opportunities for professionals to develop competence in the classroom delivery of technology education through the sponsorship of in-service programs.

Individual technology education professionals who gave leadership to other professionals in the curriculum change process. These professional leaders piloted many technology education activities in their classrooms and served as role models for other professionals.

Members of the N.C. Council of Technology Teacher Educators who provided insite and support throughout the curriculum redirection process.

Indiana curriculum developers who provided curriculum materials adopted and adapted for North Carolina Technology Education programs.

INTRODUCTION

The North Carolina Technology Education Curriculum is a program to meet every citizen's need to be technologically literate. Some basic assumptions underlie the program, and these can be divided into content assumptions, and learner assumptions.

The curriculum was developed using the belief that the appropriate content for the field is technology, and its impact on individuals and society. It was further assumed that the content is best organized around human productive systems that have been used, are now being used, and will, most likely, continue to be used. These universal systems are communication, construction, manufacturing, and transportation. Finally, it was assumed that this content can best be addressed from a systems approach with its inputs, processes, outputs, feedback, and goals/restraints.

The curriculum was further based on the assumption that education should meet the needs of individuals and the human requirements of society. It was assumed that each person living in a technological society should have a basic understanding of and the ability to assimilate the knowledge about technology. People it was assumed, should be able to interact with the technological nature of society and help impact the type of future new technologies can provide. Additionally people should be able to be contributors to a society in their several roles, including citizen, voter, investor, consumer, worker, and leader.

These assumptions caused the curriculum to be developed in such a way as to:

1. Provide an overview of technology first, allow for more indepth study in specific technological areas, and culminate with synthesis activities.

2. Be more teacher-directed, content-centered in early courses, and highly, student-directed, process centered in advanced courses.

3. Involve problem-solving and group activities of all courses.

4. Stress the how and why of technology and its relationship to our quality of life.

5. Be activity-centered learning, with the content being used to determine the appropriateness of each activity selected.

6. Be equally important to young women and young men, both of which must function in a technological society.

Finally, the curriculum was developed to be descriptive rather than prescriptive. The materials describe what to teach and suggest ways of teaching the content. At no time are daily activities prescribed in such a way to preclude individualizing the presentations to meet local conditions.

THE CURRICULUM GUIDE IN AN INSTRUCTIONAL SYSTEM

Each course in the North Carolina Technology Education Curriculum is seen as a dynamic activity involving a complete instruction system. This system generally includes seven components: the teacher, the students, a texbook when available, the curriculum guide, laboratory sheets, apparatus, and a reference library.

THE TEACHER

The teacher plays the primary role in the system. This role entails being a curriculum developer. The teacher chooses the points to emphasize and to evaluate. Care should be taken to insure that the coverage of the subject is comprehensive. You should resist "picking and choosing" only modules and activities that are the most interesting, most familiar, or the easiest to implement. All modules and activities should be included. However, you are encouraged to redesign or replace activities with your own activities that contain equivalent content.

As a technical expert, the teacher gives presentations, demonstrations, and asks questions about the subject matter. Safety information, and the demonstration of teaching/learining activities, are the responsibility of the teacher.

The teacher is an instruction manager. Managers plan, schedule, direct, and control activities. The teacher, perhaps in cooperation with students, plan the instruction by identifying the instructional goals. The activities to reach these goals are scheduled. Through presentations and application activities students are directed through the construction activities. Finally, the student's work and the teacher's management is controlled through various forms of evaluation. Since evaluation instruments should be designed to measure success in reaching the goals, these instruments should be prepared by the teacher.

The teacher is the creator of the teaching/learning environment. It is highly recommended that you create a "role playing" environment. In addition to having students do tasks that simulate construction, have them play the role of workers, managers, and owners. For example, refer to a group of students as a "work crew" or "survey party" with job titles, rather than as students who carry out assigned tasks. Help them visualize themselves in their roles. The teacher can become a job superintendent, owner, or government officer, who approves the "work crew's" job.

THE STUDENT

The target population is made up of middle-junior high or high school students. The students will often work in groups of from three to five. Their responsibilities include reading the textbook assignments, doing the worksheets as homework, and completing the activities.

THE TEXBOOK

A textbook should be selected for the course and each student should have one. A textbook contains the body of knowledge about industrial technology. It should be selected to meet the appropriate reading level, and be written in an interesting way with numerous illustrations.

THE CURRICULUM GUIDE

The curriculum guide is to be used to help plan your instruction. The introduction consists of a structure for the content and a description of an instructional system with suggestions on how to use it.

The remainder of the curriculum guide briefly describes the modules. Each module consists of an introduction, objective(s), and a description of the activities. The description of the activities includes a schedule, presentation titles, application activities, and presentation titles, references, and safety guidelines. Suggestions for getting prepared and carrying out the activity are found in the teacher activity sections.

Suggestions for a variety of optional activities may also be found throughout the curriculum guide.

THE APPARATUS

Often the course guide contains plans for specialized apparatus useful in teaching the course. Drawings will be placed with the activity in which they are used. You can use the drawings to construct the apparatus.

THE REFERENCE LIBRARY

Some courses require student reference books. The titles of these are included in the reference library and copies should be purchased for laboratory use.

DAILY LESSON PLANS AND EVALUATION

The planning of daily activities and an on going evaluation system are th teacher's responsibility and rightfully so. Each student should adapt activities and presentations to insure they help students develop the identified concepts within local conditions. The curriculum guide was designed to help you, the local professional, present a relevant, exciting course. Good luck!

INTRODUCTION

When we view the world of manufactured products, it becomes readily apparent that two technologies were used in producing our human-made world. Materials were processed to change their form in order to add to their value and usefulness. These activities were introduced in the course **Introduction to Manufacturing Technology** and presented in depth in **Manufacturing Materials and Processes.**

Also, managed systems were established to produce products in quantities using efficient methods. This management technology was again introduced in **Introduction to Manufacturing Technology** and presented in depth in **Product and Manufacturing System Design.**

This course, **Manufacturing Enterprise,** fuses these two technologies, material processing and management, into a realistic whole through the dynamics of an industrial enterprise. The course provides students a chance to study the workings of an enterprise where all functions are being carried out at one time and to apply their previously gained knowledge of manufacturing materials, processes, and management.

The course is organized into five modules. The first module reviews the basic concepts of a managed manufacturing system. The second module is a study of the research and development activities as they apply to a manufacturing enterprise. The third module is a brief one in which the students organize their enterprise. During the fourth module, which is the longest, the students operate the enterprise. The final module is designed to allow the students to close and liquidate their enterprise and to review the impact of manufacturing enterprises on individuals and society.

This course is designed to be student-centered. The teacher should, whenever possible, play the role of consultant. The students should NOT come to the teacher for answers to problems or directions for the next step. Instead they should use the teacher as a resource person who will react to their ideas, plans, proposed actions, etc. The teacher should stress that his/her ideas are AN answer not THE answer. There is always more than one way to complete any task.

OBJECTIVES

This course provides students with an in-depth experience in the organization and operation of a manufacturing enterprise. At the end of the course each student should understand:

1. The term manufacturing enterprise.
2. How products are developed and engineered in a manufacturing enterprise.
3. The need for and process of developing management plans and schedules.
4. The basic managed areas of activity in a manufacturing enterprise—research and development, production, marketing, industrial relations, and financial affairs.
5. The interrelationships among the managed areas of activity within a manufacturing enterprise.
6. The way manufacturing enterprises are formed and closed.
7. The impacts of manufacturing enterprises on individuals and society.

TEXTBOOKS

Two textbooks seem appropriate in terms of content presented and reading level. These are:

Wright, R. Thomas, Manufacturing: Material Processing, Management, and Careers, Goodheart-Willcox Co. 1984 (An Instructor's Guide and a Laboratory Manual are available and should be used.).

Kruppa, J. Russell and John R. Lindbeck, Basic Manufacturing, Bennett and McKnight Publishing Company, 1985.

COURSE OUTLINE

Module Number	Title and Content	Time (Days)
1.	Introduction to the manufacturing enterprise What is an enterprise? What is management? Components in a managed production system	5
2.	Developing a product for manufacture Identifying product needs Developing product criteria Generating product ideas Evaluating product ideas Engineering products Determining product feasibility Selecting products for manufacture	24
3.	Organizing the enterprise Incorporating the enterprise Developing corporate organizations Staffing organizations Setting goals and courses of action Scheduling activities	5
4.	Operating the enterprise Developing production systems Developing marketing systems Developing personnel systems Developing financial control systems Operating developed systems Producing products to specifications	40
5.	Closing the enterprise Dissolving the corporation Liquidating assets Impacts of enterprises on individuals and society	5

MODULE: 1 : Introduction to the Manufacturing Enterprise

LENGTH: 6 DAYS Manufacturing CLUSTER

The term enterprise and the dynamics of all segments of a company working at one time are, most likely, foreign to the class. A proper stage and a common reference for early discussions must be established. This module is designed to provide basic information through discussions and this common reference through a teacher-designed line production activity.

The common concepts included in this module are (1) enterprise, (2) industry, (3) management, and (4) activity areas. These are defined as follows:

1. Enterprise: a single business unit formed to produce products or perform services at a profit to its owners. These units may be proprietorships, partnerships, or corporations.

2. Industry: a group of enterprises which produces competing products; such as, the automobile industry, the steel industry, the chemical industry, the forest products industry.

3. Management: a group of people who plan and direct company activities so that they are efficient. The functions of these people are:

    a. planning: setting goals and courses of action.
    b. organizing: dividing tasks into jobs.
    c. directing or actuating: assigning and supervising work.
    d. controlling: comparing results with the plan.

4. Activity Areas: managed areas which move a designer's idea through various stages until it becomes a product on the market. These areas include:

    a. research and development: discovers, develops and engineers new or improved products and processes
    b. production: engineers the production facility and produces scheduled products to specified standards.
    c. marketing: identifies the market for the product and then promotes, sells and distributes the product.
    d. financial affairs: raises and manages the enterprise's money and purchases needed materials and supplies.
    e. industrial relations: recruits and develops an efficient work force and manages the enterprise's public, union, and employee relations programs.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. define enterprise
2. define management
3. list and describe the functions of management
4. list and describe the managed areas of activity.

CALENDAR

DAY	ACTIVITY
1	Complete administrative details to get class started.
	Introduce class organization and objectives to the students.
2	Discuss "Enterprise and Management."
	Discuss "Areas of Activity."
3-5	Demonstrate introductory production line.
	Have each student perform an assigned job on the production line.
6	Review "Enterprise, Management and Areas of Activity."
	Discuss "Career and Career Ladders in Enterprises."

PRESENTING THE MODULE

DAY	ACTIVITY
0	Well before the introduction of this unit, develop a simple line production using jigs and fixtures (tooling) and mainly hand tools. Do not forget to include packaging in the line. A typical product with its tooling drawings can be found on pp. 43-46 of the Instructor's Guide for Wright, Manufacturing. Other product ideas can be found in the Instructor's Guide for Wright, Manufacturing, 35, 37, and 41, and in Kruppa, Basic Manufacturing, pp. 150, 158, and 179. Be sure to design tooling to locate all cuts, holes, etc. Templates and hand layout should not be used. A good production system removes as many chances for human error as possible. Prepare an "Introduction to Manufacturing Enterprise Class" presentation. A slide series of earlier classes activities makes an excellent introduction. Stress the student-centered approach that this class will use. Indicate that the class will have fewer presentations than most classes and that the students will be required to be self-directed in the search for information and completion of assigned tasks. This presentation should take about 1/2 a class period. Prepare a 20-25 minute presentation on "Enterprise and Management". Introduce the concept of enterprise then compare it with the term industry. Introduce the concept of management as a key to an enterprise's success. Present the functions of management. Prepare a 15-20 minute presentation on "Managed Areas of Activity in a Manufacturing Enterprise." List and describe each of the five areas and stress their interrelationships. Prepare a 20-25 minute review of the content in Module 1. Prepare a 20-25 minute introduction to "Manufacturing Careers and Career Ladders". Stress the wide variety of manufacturing careers and the movement up career ladders in career clusters. Relate the levels of education needed by various career levels.

PRESENTING THE MODULE

DAY	ACTIVITY
1	Complete administrative details needed to start a class.
2	Introduce the students to the "Plan of Action" for the course — objectives, planned activities, etc. (Use prepared presentation.) Present prepared presentation on "Enterprise and Management." Set up production line after school for next day's use.
3-5	Present prepared presentation on "Managed Areas of Activity in an Enterprise." Demonstrate Production Line. Have an operation process chart on the chalkboard, a transparency, or poster. Assign each student a task on the line. Have each student stand next to you as you demonstrate his/her task and take notes on proper operation and safety procedures. The other students should observe each demonstration. CAUTION: do not over demonstrate--tool names, etc. are not important for this activity. Proper, safe operation is the key. Each mini-demonstration should take less than one minute. Each student may use a form like the one below to record information for his/her job during the "specific demonstration."

INTRODUCTORY LINE PRODUCTION

ASSIGNED JOB: _____

Procedure	Safety
1.	
2.	
etc.	

DAY	ACTIVITY
	When the demonstrations are complete have the students complete their assigned task on one part as it "walks" down the line. Observe each operation and redemonstrate where safety or operational errors require additional training.
	Finish production and packaging activities.
6	Present the prepared review of the concepts presented in this module.
	Present the prepared discussion on "Careers and Career Ladders."

BIBLIOGRAPHY

Kruppa, J. Russell and John R. Lindbeck, Basic Manufacturing, Peoria, IL: Bennett and McKnight Publishing Co., 1985, 10-17.

Wright, R. Thomas, Manufacturing, South Holland, IL: Goodheart-Willcox Co., 1984, 6-26, 89-108.

Wright, R. Thomas, Manufacturing-Instructor's Guide, South Holland, IL: Goodheart-Wilcox Co, pp. 9-14 (Introductory Product).

MODULE: 2: Developing a Product for Manufacture

LENGTH: 24 DAYS Manufacturing CLUSTER

Almost all manufacturing companies started with one or more people having an idea for a product which they thought would sell. They usually developed the product to a level that they could obtain financial support then formed a company to produce the product. Later the company developed new products to replace the original product or to be marketed with it.

The product development activity is usually the responsibility of a Research and Development activity within the company. This R&D activity usually has three major functions which are:

1. Research: seeking and discovering knowledge.

2. Development: applying knowledge to product and processes.

3. Product Engineering: specifying the characteristics of new products.

This module is designed to help students understand and practice the activities used by manufacturing enterprises in developing new or improved products. The module is divided into two major segments. The first allows each student to identify and present an idea for a new product. The class then narrows the number of products to the 3-5 which show the most promise from design, manufacture, market, and financial perspectives.

The second segment has the students forming teams which will develop and end engineer the selected products. Each team will:

1. refine the product ideas.
2. construct a prototype.
3. design a market survey instrument.
4. conduct a market survey using the prototype and the survey instrument.
5. prepare engineering drawings and bills or materials.
6. prepare a cost estimate for the product.
7. conduct a competitive analysis.

At the end of the module, each team will present the ideas with supporting data. The class will choose the "best" product for manufacture.

OBJECTIVES

Upon completing this learning module, each student should should be able to:

1. define research and development.
2. list and describe the three major functions of research and development.
3. describe the major activities involved in product idea generation and evaluation.
4. describe the major activities involved in product development and engineering.
5. generate and communicate a product idea.
6. evaluate product ideas against predetermined criteria.
7. participate in a product development and engineering team.

CALENDAR

DAY	ACTIVITY
1	Present discussion on "Research and Development." Show filmstrip "Developing Products for Manufacture."
2	Present the product idea generation assignment. Develop a set of product criteria through class discussion.
3-5	Review sketching techniques. Have the students work on product idea generation assignment.
6	Each student should present his/her product ideas.
7	Present "Product Development and Engineering" discussion. Show filmstrip: "Presenting Products for Managerial Approval."
8	Develop product development and engineering groups. Assign a product, chosen on day 6, to each group Have the students brainstorm improvements for the assigned product.
9	Have each student accept one or more tasks for the product development team including: 1. building a prototype 2. conducting a market survey 3. preparing drawings 4. making a bill of materials 5. conducting a competition analysis 6. preparing a cost analysis.
10-18	Have the students complete the assigned product development and engineering activities.
19-21	Review "Presenting a Product for Managerial Approval." Have the students: 1. plan the product presentation 2. prepare presentation materials
22-23	Have the students present the group's product for managerial.
24	Review R&D activities.

PRESENTING THE MODULE

DAY	ACTIVITY
0	Well before introducing this module to the students the following tasks should be completed: Obtain listed filmstrips: 1. "Developing Products for manufacture" 2. "Presenting Products for Managerial Approval" Prepare discussions on: 1. Research and Development 2. Product development and engineering CAREFULLY study the Instructor's Guide for Wright, Manufacturing, pages 67-69, for a detailed explanation of the method for operating the R and D phase of this course. This technique will work with either of the two recommended textbooks.
1	Present the prepared discussion on Research and Development. Emphasize the task of R&D and the three major functions--research, development, and product engineering. If possible have drawings, prototypes, bills of materials, etc. to show to reinforce the work done by R&D personnel. Show the filmstrip, "Developing Products for Manufacture," which is available from: Manufacturing Forum Department of Industry and Technology Ball State University Muncie, IN 47306 Cost: $10.00 for filmstrip and tape
2	Present the product idea generation assignment. Have the students: 1. state the problem 2. develop rough sketches of several ideas which will solve the problem. 3. refine the best idea. 4. estimate the material cost for the product using a catalog, such as Brodhead-Garrett or Paxton Patterson. Forms such as those found on pp. 78-80 in the Laboratory Manual for Wright, Manufacturing, may be used or you may develop your own.

DAY	ACTIVITY

Before the class starts to identify problems or sketch ideas, they should develop some criteria or limitations to guide their work. In discussion or by using brainstorming groups develop criteria in the areas of:

1. design
2. manufacture
3. market
4. finance

You may want to limit size by placing a cost limit for materials ($1.00-$1.50). Also to increase the educational value of the later experiences, it is recommended that the product have at least two distinctively different parts to that tooling and quality control become essential. HINT: Avoid products with many small parts and boxes which are very difficult to construct. Both Kruppa, Basic Manufacturing, and the Instructor's Guide for Wright Manufacturing, have product ideas which may guide your thinking. But DO NOT assign them to the class. The class should develop their own product within the stated criteria. A form which can be used for this criteria development activity is found on page 77 of the Laboratory Manual for Wright, Manufacturing.

3-5 As a prelude to idea development, a BRIEF review of sketching may be needed. This review should not take more than 20-25 minutes.

Have each student select a problem which can be solved with a new product, then state it as a problem. For example, the student may want to design a device to hold books upright (not design a set of bookends-this is a solution not a problem).

1. Each student should develop a series of 3-5 solutions for the problem, making a rough sketch of each idea.

2. Select the best idea or best features from the several ideas and develop a refined sketch of the suggested product.

3. Using a catalog, determine the cost of the materials needed to build the product.

The teacher should serve as a consultant as the students complete their design assignment. Remember they should:

1. state their problem clearly.
2. develop rough sketches for several solutions to the problem.
3. refine the best solution.
4. prepare a cost estimate for the refined solution.

DAY	ACTIVITY
6	Have an opaque projector available for the product idea presentations. Students should present their refined ideas explaining the general features of the product, its use, the estimated material cost, and other general information. They should not suggest how it will be built. The students may use a form like the one found on page 81 of the Laboratory Manual for Wright, Manufacturing, to evaluate each idea that is presented. They can give each idea a score of 1-5 or 1-10 on each factor. At the end of the presentations, the students may vote to select the best 3-5 products. You will need a product for each 4-5 students in the class.
7	Present the prepared discussion of Product Development and Engineering. Emphasize the task of moving the product from a two dimensional sketch into a three dimensional object. Also, note that each product must be acceptable in the market (reason for market survey), be within the financial resources of the company (cost analysis), compete with other products (competitive analysis), and have it features communicated to management and production personnel (engineering drawings, bill of materials, and data summary sheets). Show filmstrip "Presenting Products for Managerial Approval" which is available from: **Manufacturing Forum** (Address and cost listed under Day 1).
8	Divide the class into groups of 4-5 students. Care should be taken to insure that each group has a fair distribution of talent. Assign one of the accepted products to each design group. Have the students list all the improvements they can for the product. They should analyze these improvements, selecting the best one for incorporation into their final design. This activity may extend into Day 9.
9	Have the students divide the tasks facing them among members of the team. (Form 24-5 in the Laboratory Manual for Wright, Manufacturing, p. 83, lists these tasks.) Be sure that each task is assigned to only ONE student. This is the student responsible for seeing that the task is finished. All the students may help but only one must be responsible for its completion.
10-18	This block of time is designed for the students to complete their Product Development and Engineering responsibilities. Short presentations on the following may be needed:

DAY	ACTIVITY

1. developing a market survey instrument
2. preparing engineering drawings
3. preparing a bill of materials
4. determining product costs
5. etc.

See Appendix for a flow diagram for this activity.

Forms for these activities are found in the Laboratory Manual for Wright, Manufacturing, pp. 83-92.

If the group or members in it complete their work they can start preparing materials for the product presentation described in Day 22-23.

REMEMBER this is a synthesis class. The students should be expected to apply the knowledge they gained in other classes or be resourceful in obtaining new knowledge. This class studies the process of operating an enterprise and is not designed to develop quantities of factual knowledge.

19-21 Review "Presenting a Product for Managerial Approval." You may want to show the filmstrip again as a review.

The students, then, should prepare a formal product presentation. They should have a data summary sheet for their product for each member of the class, and be ready to present their product with supporting cost, market, manufacturing, and engineering data.

They should NOT tell how to build the product. Later the production department will develop a manufacturing system. Encourage the students to use slides, posters, transparencies, etc.

22-23 Each group should present their product to the class using the materials they prepared during days 20-22.

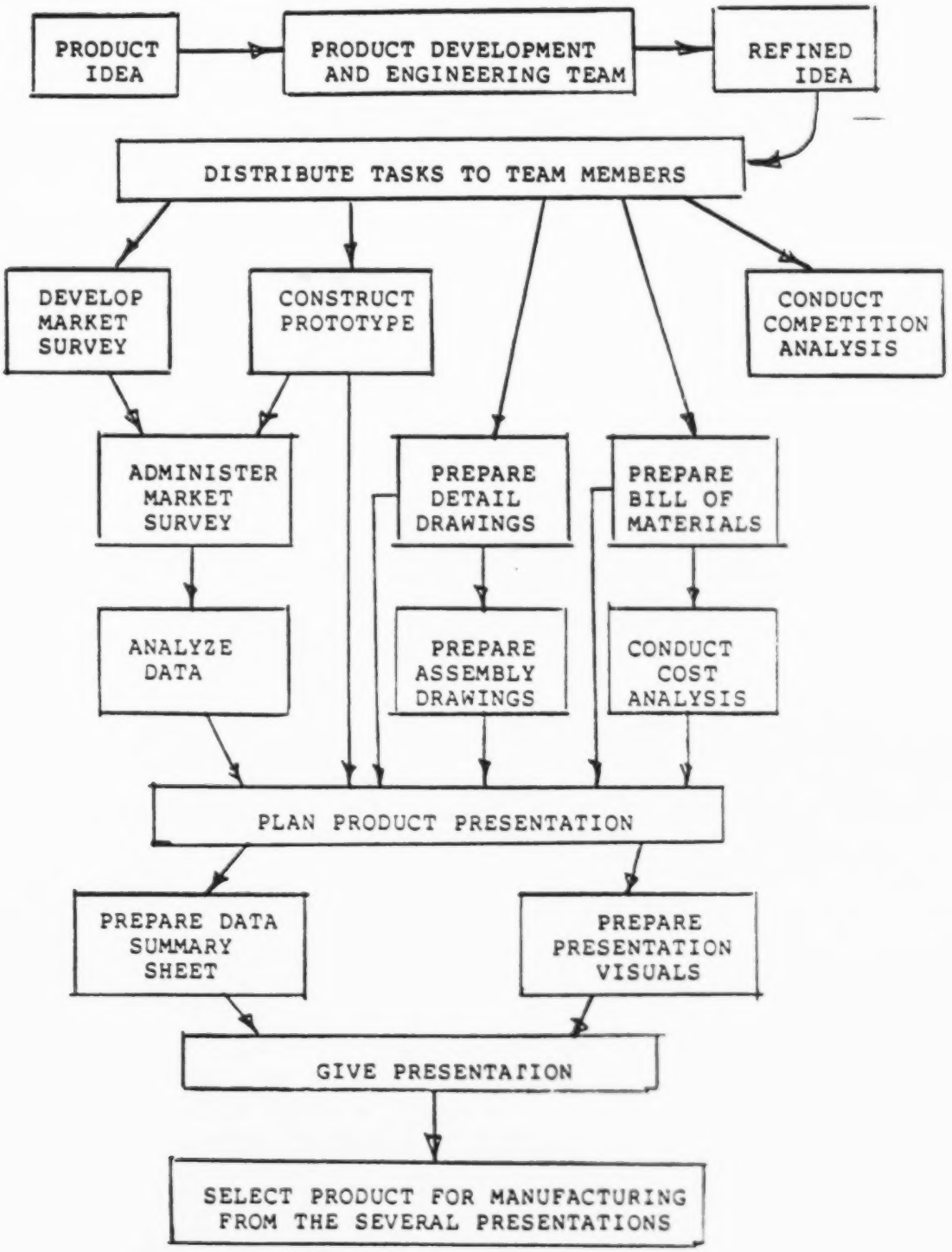
At the end of the presentation, summarize the strengths and weaknesses of each product through class discussion. Do NOT dwell solely on production factors.

Finally, have each student rank the products on a paper ballot. You may want to use a weighting system to make the final selection. Also, reserve the right to disqualify any product that does not meet the stated criteria.

24 Review the R&D activities with the students.

PPENDIX

Tasks and approximate sequence of events of Product Development and Engineering Activities.



BIBLIOGRAPHY

TEXTBOOKS

Kruppa, J. Russell and John R. Lindbeck, Basic Manufacturing, Peoria, IL: Bennett and McKnight Publishing Co., 1985, pp. 30-41.

Wright, R. Thomas, Manufacturing, South Holland, IL, Goodheart-Wilcox Co., 1984, pp. 125-136, 203-216.

Wright, R. Thomas, Manufacturing Laboratory Manual, South Holland, IL, Goodheart-Willcox Co., pp. 77-92.

Wright, R. Thomas, Manufacturing-Instructor's Guide, South Holland, IL: Goodheart-Willcox Co, pp. 67-69.

FILMSTRIPS

"Developing Products for Manufacturing", (Filmstrip with audio - tape - $10.00)

"Presenting Products for Managerial Approval", (Filmstrip with audio - tape - $10.00)
Available from:
Manufacturing Forum
Department of Industry and Technology
Ball State University
Muncie, IN 47306

MANUFACTURING ENTERPRISE

MODULE: 3 : Organizing the Enterprise

LENGTH: 5 DAYS Manufacturing CLUSTER

Once a group of individuals has a developed product, they often form a company. They may select one of three basic legal structures for their company:

1. Proprietorship
2. Partnership
3. Corporation.

The new business entity is officially formed when proper forms are filed and any required licenses are obtained. The most important form of manufacturing ownership if the corporation. These organizations produce the vast majority of products that we buy and use. Therefore, it is recommended that the students form a corporation for their business activity.

The act of forming a corporation is governed by the laws of each state. The official forms and information may be obtained from the Secretary of State or similar officer at the State Capitol. However, some basic steps are commonly followed in forming a company. These are:

1. Articles of incorporation are filed with state with a required fee.
2. A charter to operate within the state is given the new corporation. This charter is recognized by all other states.
3. A set of bylaws for the corporation are prepared.
4. A board of directors is elected to set policy for the company.
5. A managerial structure is formed and staffed.

This module allows the students to form a model corporation to produce and market the product which was selected at the end of Module #2.

OBJECTIVES

Upon completing this module, each student should be able to:

1. describe the procedure in incorporating a business.
2. describe the major levels of authority present in a typical manufacturing enterprise.
3. establish goals for a managerial position.
4. develop a schedule for tasks required to complete the functions of a managerial position.
5. define and describe trademarks and tradenames.

CALENDAR

DAY	ACTIVITY
1	Discuss "Organizing a Corporation". Have the students prepare Articles of Incorporation for the company.
2	Discuss "Corporate Managerial Structures." Have the student complete an application blank for a job in the company.
3-4	Appoint President and Vice Presidents for the company. Vice Presidents should "hire" employees for their areas. Discuss "Planning and Scheduling." Each department should list and schedule tasks to be completed by their area.
5	Discuss "Trademarks and Tradenames." Show filmstrip, "What's in a Name?" Complete a trademark, tradename, and slogan assignment.

PRESENTING THE MODULE

DAY	ACTIVITY
0	Well in advance of introducing this module, the following tasks should be completed: All presentations should be prepared. Obtain copies of the necessary form for incorporating a company in your state from the Secretary of State at the State Capitol. An organization chart for the company should be established. Carefully study pp. 69-75 in the Instructor's Guide for Wright, Manufacturing, regardless of which text you are using.
1	Present a discussion on "Organizing a Corporation." Present the steps required to legally form a company. Show students the actual forms that are used in your state. Complete an "Articles of Incorporation" form for your company. (A sample form is on p. 93 of the Laboratory Manual for Wright, Manufacturing.
2	Discuss "Corporate Managerial Structures". Emphasize the flow of authority and information. (Authority downward. Information both ways: Goals, directives, etc., downward; Results, suggestion, etc., upward.) Introduce the class to the structure to be used in the class which was developed before introducing this module to the students. Have the students: Complete an application blank for a managerial position. A sample blank can be found on p. 121 of Wright, Manufacturing Laboratory Manual.
3-4	Using the application blanks and other information, appoint a President, and Vice Presidents for Production, Marketing, Financial Affairs, and Industrial Relations. You may also want to appoint one or two union organizers. Discuss planning and scheduling as a vital first step in management. Planning is setting goals and scheduling establishes deadlines for each task required to meet the goals. STRESS the importance of deadlines and each person working cooperatively to meet mutually accepted goals.

DAY	ACTIVITY
	Oversee the establishing managerial positions and schedules. The students will learn much more if they use their textbooks to first identify the tasks they think are important, have them reviewed by the teacher, and finally establish deadlines for each task. The procedure would be:
1	student establish tasks for his/her job.
2	teacher reviews the task list, adding and deleting tasks as necessary.
3	the student, working within the group establishes deadlines for each task. Major deadlines should be established by the teacher. These include the dates for:
	a. all tooling to be tested.
	b. pilot run.
	c. production run.
	d. sales started.
	e. sales completed.

DAY ACTIVITY

The students can use a form similar to the one below:

MANAGERIAL CONTRACT & SCHEDULE

Position_____

Manager's Name_____

TASK	DEADLINE

5 Discuss "Trademarks and Tradenames." Have a selection of common:

1. Trademarks (logos)

2. Tradenames

3. Advertising slogans
   a. "You're in Good Hands with Allstate"

   b. "Hallmark; When You Care Enough to Give the Very best."

A slide series would be an excellent vehicle to show these.

Have the students:

Complete the trademark assignment.
Example for p. 139 in the Laboratory Manual for Wright, Manufacturing.

BIBLIOGRAPHY

TEXTBOOKS

Kruppa, J. Russell and John R. Lindbeck, Basic Manufacturing, Peoria, IL, Bennett and McKnight Publishing Co., 1985, pp. 26-29.

Wright, R. Thomas, Manufacturing, South Holland, IL, Goodheart-Willcox co., 1984, pp. 217-222.

Wright, R. Thomas, Manufacturing-Instructor's Guide, South Holland, IL, Goodheart-Willcox, pp. 69-75.

Wright, R. Thomas, Manufacturing Laboratory Manual, pp. 93-95, 106.

MANUFACTURING ENTERPRISE

MODULE: 4 : Operating the Enterprise

LENGTH: 40 DAYS Manufacturing CLUSTER

The acid test for all companies is their effectiveness at operating their production, marketing, financial, and personnel systems. Almost all companies can purchase quality materials, hire competent employees, and install efficient machines. Good companies are separated from their poorer competitors mainly by their efficient use of these resources.

This module allows the students to operate the company they formed in Module 3 to produce the product they developed in Module 2. Throughout this module the students will be working on individual tasks which contribute to the overall effort of the enterprise. The main tasks that the personnel in each department will be completing are:

PRODUCTION DEPARTMENT

1. Select and sequence operations.
2. Design and construct tooling.
3. Develop a plan layout.
4. Design and install a material handling system.
5. Develop a quality control motivational program.
6. Design and implement an inspection system.
7. Schedule people, machines, and materials for the pilot and production runs.

MARKETING DEPARTMENT

1. Design and produce advertising materials.
2. Design packages.
3. Develop a salesperson selection and training program.
4. Design and produce a sales record system.
5. Maintain sales records.
6. Develop a finished good inventory system.
7. Oversee all sales and distribution activities.

INDUSTRIAL RELATIONS DEPARTMENT

1. Develop employee recruitment and selection materials.
2. Design and implement a safety program.
3. Develop an employee communication system.
4. Maintain work records.
5. Prepare payroll.
6. Resist union organizing activities.

FINANCIAL AFFAIRS DEPARTMENT

1. Raise operating funds.
2. Maintain stockholders ledgers.
3. Prepare budgets.
4. Developing a purchasing system.
5. Purchase materials and supplies.
6. Receive and disburse all funds.
7. Maintain accounting records.

A complete listing of typical duties for each member of the four major departments can be found on pp. 70-75 of the **Instructor's Guide** for Textbook "A". Also, a tentative 7-week schedule of activities is found on page 74. This schedule will have to be expanded to a 9-week schedule for this module by adding one week before production and one week after the run.

Each week in this module will follow a common format:

Monday: Discussion of one of the activity areas.

Tuesday-Thursday: Individual work on task (See pp. 75-78 of the Instructor's Guide for hints on operating the enterprise.

NOTE: especially the use of the "Labor Pool." Also, the Laboratory Manual for Textbook "A" has many useful forms which can be used by the students in completing their identified tasks.

Friday: First half of the class period can be spent on individual work and the last 20 minutes on progress reports from the vice president's and the president's "charge for next week."

Again, remember that the students should be running the enterprise. They should not receive specific assignments from the teacher. The teacher's avenue to the employees of the enterprise is through the president. However, the teacher should always be a resource person and a cheerleader for the group.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. describe the importance of cooperative effort in completing a task.
2. identify a task and carry it out with a minimum of outside direction.
3. define the purpose of an enterprise.
4. describe how a product is produced by an enterprise.
5. describe the general duties of each activity area in an enterprise.

CALENDAR

DAY	ACTIVITY
1	Discussion: "Running Your Enterprise."
2-4	Work on identified tasks.
5	Vice president's report president is in charge
6	Discussion: "Production"
	Show filmstrip: "Developing Production System."
7-9	Work on identified tasks.
10	Vice president's reports president is in charge.
11	Discussion: "Marketing."
12-14	Work on identified tasks.
15	Vice president's reports; president in charge.
16	Discussion: "Industrial Relations" and "Unions."
17-19	Work on individual tasks.
20	Vice president's reports; president is in charge.
21	Discussion "Financial Affairs."
22-24	Work on individual tasks.
25	Vice president's reports president is in charge.
26	Discussion: "Manufacturing Products."
27-29	Work on individual tasks.
30	Set up production line.
31-32	Demonstrate safe practices on production line.
	Pilot run line; start selling products.
33-34	Adjust line as needed or start production run.
35-38	Run production line (May require fewer days).
39-40	Disassemble line; sell products.

PRESENTING THE MODULE

DAY	ACTIVITY
0	Well before introducing this module, prepare the presentations indicated for days 1, 6, 11, 16, 21, and 26. Also, develop your own plans for manufacturing and packaging the product. These plans will help you ask the right questions, NOT give students the right answer. Plan your sequence of operations, ways to tool-up the operations, inspect the parts and products, produce the package, etc. Remember, the students may come up with other ways that will work. NOTE: The students in the first five weeks follow the same sequence of activities: MONDAYS: Participate in the discussion for the week. TUESDAY - THURSDAY: work on the identified tasks for the week as outlined on the management contract and schedule sheet. MONITOR the progress CAREFULLY!!!! Do not allow students to get behind schedule without some corrective action (reassign tasks, work during a study hall, etc.). The students should use their textbooks heavily as resources for completing their jobs. Also, the Laboratory Manual for Wright, Manufacturing, has many useful forms. Libraries, local companies, and other resources should also be used. FRIDAY: Present or contribute to progress reports for each of the four activity areas.
1	Present a discussion on running the enterprise. Emphasize the teacher's role as advisor and reactor. Make sure the students know and believe that they are in fact responsible for running their enterprise. The discussion can be supplemented by a good film or video tape showing a company in action.
2-4	Help students with their tasks when asked. The hardest part of being a good enterprise teacher is letting students solve their own problems, which may mean making mistakes. Tell the student you will react to questions like "which of these package designs will be easier to count out, not what should the package look like." Also, remember that your answer is "an" answer not "the" answer.

DAY	ACTIVITY
5	Observe and ask some leading questions during the vice president's reports.
6	Present a discussion on production, which should not exceed 20 minutes. Discuss the common functions of production and show examples of the work of a production activity area. A portion of the transparency master set from the manufacturing forum can be used. You can order the set from: Manufacturing Forum Department of Industry and Technology Ball State University Muncie, IN 47306 Cost: $6.00
7-10	Same as Days 2-5.
11	Present a discussion of Marketing, which should not exceed 20 minutes, providing the same emphasis as the discussion outlined for Day 6.
12-15	Same as Days 2-5.
16	Present a discussion on Industrial Relations and Unions providing the same emphasis as the discussion outlined for Day 6.
17-20	Same as Day 2-5.
21	Present a discussion on Financial Affairs, which should not exceed 20 minutes, providing the same emphasis as the discussion outlined for Day 6.
22-25	Same as Day 2-5.
26	Present a discussion on manufacturing products which should not exceed 20 minutes. Emphasize the efficient use of human, natural (material), and capital (plant and equipment) resources. Discuss scheduling and controlling (measuring outputs against plans) operations.
27-29	Same as Day 2-4.
30	Set up the production line. All members of the class should help position equipment, install tooling, set up inspection stations, arrange the packaging area, etc.
31-32	Demonstrate the safe practices for each operation. This training session is very important. Remember, you are training a worker. They need to know the safe way to produce quality products. DO NOT use this time to teach tool names, material identification, etc.

DAY	ACTIVITY
	1. Tell each worker how to do the task safely. 2. Show each worker how to do the task safely. 3. Have each worker show you that he/she can do the task safely. 4. Ask for any questions. Observe the pilot run of the line. Have the students build ONE product down the line to test: 1. effectiveness of the training (safety, proper technique, etc.). 2. operation of machines and tooling. 3. flow of materials (bottlenecks). Have a sales training session and start product sales.
33-34	Have the students: 1. adjust or rebuild tooling. 2. receive additional training. 3. add operations or workers to eliminate bottlenecks.
35-38	Have the students: Perform assigned tasks on the production line. Observe the production run insuring that safe practices are followed and that machines stay in adjustment.
39-40	Have the students: 1. disassemble the production line. 2. complete sales. 3. take down advertisements in the school. 4. turn in all money from sales. 5. pay bills. 6. etc.

BIBLIOGRAPHY

TEXTBOOKS

Kruppa, J. Russell and John R. Lindbeck, Basic Manufacturing, Peoria, IL, Bennett and McKnight Publishing Co., 1985, pp. 42-119.

Wright, R. Thomas, Manufacturing, South Holland, IL, Goodheart-Willcox Co., 1984, 137-198, 217-300.

Wright, R. Thomas, Manufacturing-Instructor's Guide, South Holland, IL: Goodheart-willcox Co., pp. 69-75.

Wright, R. Thomas, Manufacturing Laboratory Guide, South Holland, IL: Goodheart-Willcox Co., pp. 97-186.

MODULE: 5 : Closing the Enterprise

LENGTH: 5 DAYS Manufacturing CLUSTER

The final act of any enterprise is closing down. In reality, this is done for two basic reasons: (1) the owners want to get the investment out of the company and they feel that they can receive more money by liquidating the company than by selling it to another corporation; and (2) the company cannot meet its bills nor receive support to reorganize, therefore, must sell all its assets to meet the demands of the creditors. The first type of closing is called voluntary liquidation while the second is called involuntary liquidation or bankruptcy.

This module is designed to allow the students to close their enterprise in an orderly fashion. They will sell all remaining assets; such as remaining materials, surplus finished goods, and special tools purchased for the production run. Their company must also collect all accounts receivable; such as product sales dollars. Then all the outstanding bills must be paid. Finally, the remaining money should be distributed to the stockholders.

In addition, this module will allow the students to investigate the impacts of corporate enterprises on individuals and the society in general.

OBJECTIVES

Upon completing this learning module, each student should be able to:

1. Explain the two basic procedures for closing an enterprise.
2. Describe ways that manufacturing enterprises positively and negatively impact on individual's life.
3. Describe ways that manufacturing enterprises positively and negatively impact the society in general.

PRESENTING THE MODULE

DAY	ACTIVITY
1	Discuss "Closing an Enterprise." Have the students: 1. liquidate assets 2. pay bills.
2-3	Introduce "Impact of an Enterprise." Have the students: research and list impact of an enterprise.
4	Have the students report on their "impacts of an enterprise" research.
5	Close company. Review course.

PRESENTING THE MODULE

DAY	ACTIVITY
0	Well before introducing this module, prepare for the discussions of: 1. Closing the enterprise. 2. Impacts of an enterprise. Write to some major corporations for copies of their annual report. These can be used by the students to design their annual report. NOTE: The length of this module may be extended by a few days if the production portion of Module #4 takes less than the allotted time or if all assigned days for the course are not used. Place the extra time into the discussion and reports on impacts of an enterprise on individuals and society.
1	Discuss "Closing an Enterprise." Emphasize the procedure for closing an enterprise and the two basic types of liquidations—voluntary and involuntary. This discussion should be short—10 to 15 minutes. Form student groups to: 1. place a value on land liquidate assets. 2. file articles of dissolution (Wright, "Manufacturing Laboratory Manual," p. 187). 3. closing and auditing the books. 4. prepare annual report.

PRESENTING THE MODULE

DAY	ACTIVITY
2-3	Introduce the "Impacts of an Enterprise" This presentation should be an introduction to the research and reporting activity the students will engage in during this module. Have the students: select a major impact on an enterprise on individuals or society; such as employment, pollution, providing goods, etc. 1. Prepare a newspaper, magazine, etc. clip file. 2. List both positive and negative impacts related to the topic. 3. Prepare a posterboard display, report, etc. on the topic.
4	Have the students: present the findings of the "Impact Study."
5	Close the company and the course.

BIBLIOGRAPHY

TEXTBOOKS

Kruppa, J. Russell, Basic Manufacturing, Peoria, IL, Bennett and McKnight Publishing Co., 1985, pp. 130-137.

Wright, R. Thomas, Manufacturing, South Holland, IL, Goodheart-Willcox Co., 1984, pp. 301-304.

Wright, R. Thomas, Manufacturing Laboratory Manual, South Holland, IL, Goodheart-Willcox, Co. pp. 187-188.